ARAD

octave

Ultrasonic Bulk Water Meter

Installation Manual

A Member of the ARADGROUP
Integrated Metering Technologies

1.0 General and safety

- Do not install, operate or maintain this flow meter without reading, understanding and followingthe factory-supplied instructions. Otherwise, injury or damage may result
- Read these instructions carefully before beginning installation and save them for future reference.
- Observe all warnings and instructions marked on the product
- Consider handling and lifting instructions to avoid damage
- If the product does not operate normally, refer to the service instructions or to a qualified ARAD service engineer
- There are no operator-serviceable parts inside this product

2.0 Product liability and warranty

Arad's standard products (the **"Products"**) are sold to Customer and are purchased by Customer under the terms of warranty set forth herein below:

1. Arad warrants that the Products shall, under conditions of normal use and when properly installed, administered , applied and maintained, be free from defects in material and workmanship (the "Warranty"), for a period of 12 months following delivery thereof to Customer (the **"Warranty Period"**).

2. Arad's sole obligation and liability under the Warranty shall be limited to the replacement, the repair or the refund of the original purchase price, at Arad's sole discretion, of any defective Products which are proven not to conform to the Products' specification and which are returned to the factory or service center designated by Arad during the Warranty Period by the Customer after completing a failure report. All provided that written notice of such defect is given by the Customer to Arad within 21 days after discovery thereof. Freight cost to such factory or service center will be paid by the Customer and freight cost from such factory or service center to Customer will be paid by Arad.

3. Arad will not be responsible for and will have no obligation under the Warranty to any non-conformity of the Products, caused, in whole or in part, as a result of misuse, abuse, tampering with or modification of any of the Products and/ or by accidents, fault or negligence, improper administration, application and/or use, installation, service, repair and/ or maintenance of the relevant Products, by act of vandalism or by any causes whatsoever (including but not limited to environmental conditions) that are external thereto.

4. The foregoing warranty is a limited warranty and is exclusive and in lieu of all other warranties, express or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose and shall constitute the Customer's sole and exclusive remedy with respect thereto. Replacement or repair in the manner provided above will constitute fulfillment of all of Arad's obligations with respect to the quality and performance of the products. No dealer, distributor, agent or employee of either Arad or customer is authorized to modify these warranties. Such modification shall be null and void and shall not bind Arad for any and all purposes.

5. Except and to the extent provided under the warranty, in no event shall Arad be liable, whether in contract, tort or otherwise, for any damages, whether direct or indirect, consequential, incidental, special or punitive, resulting from any defect in the products, including, without limitation, loss of profits, business, income, anticipated savings, goodwill or other commercial loss, even if Arad had been advised of the possibility of such damages, except to the extent that such liability may not lawfully be excluded.

Customer shall be solely responsible for the selection, use, efficiency and suitability of the Products.

3.0 Items included with order:

- One OCTAVE ultrasonic flow meter, size as indicated on the packaging box, pieced together into a complete compact system (flow tube plus electronics)
- One OUTPUT module, either digital or analog (based on the customer's order)

4.0 Supplied Documentation:

- Condensed installation and user manual
- Report of factory meter settings
- Certificate of calibration data

5.0 Unpacking and Inspection

- This product has been thoroughly inspected and tested before shipment and is ready for operation.
- After carefully unpacking the meter, inspect for shipping damage before attempting to install. If any indication of mechanical damage is found, immediately contact the responsible transportation service and your local ARAD LTD. representative.

6.0 System Description and Measurement Method

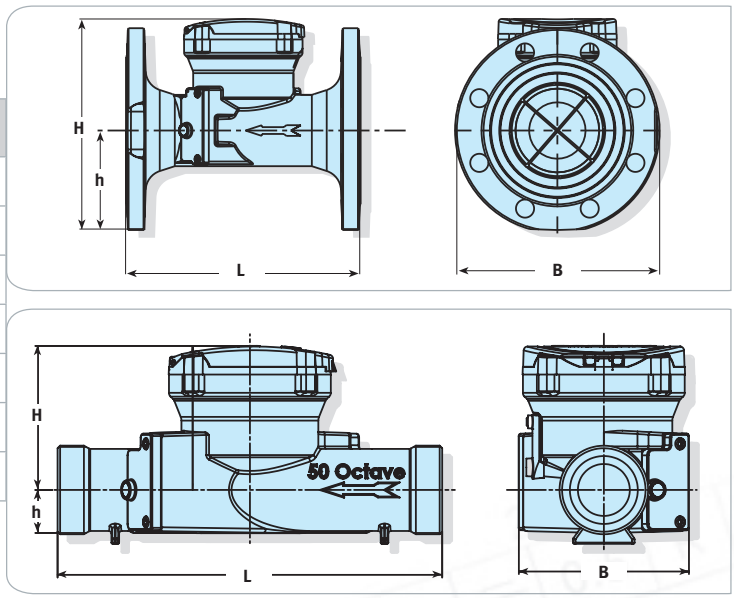
- The OCTAVE's measurement method is based on an ultrasonic, transit-time, dual-beam sensor which determines the length of time it takes an ultrasonic sound wave to travel the distance between the two sensors located on the meter's body. The two sensors function as both the sender and the receiver, each one alternating these functions so that the ultrasonic wave travels both with and against the direction of the flow. Since the ultrasonic wave travels slower against the flow than with the flow, the time difference of two waves traveling with and against the flow leads to determining the velocity of the water
- The OCTAVE ultrasonic flow meter is a battery-powered precision flow meter designed for linear, bidirectional flow measurement of water
- Flow measurement values can be transferred through the standard digital or analog output
- The OCTAVE can be set up for a wide range of applications

7.0 Mechanical Data

Maximum Working Pressure	16 bar
Liquid Temperature	0.1-50°C
Precision Class	ISO 4064 rev.2005
Configuration	Compact - The display is built in to the unit
Power Source	2 D size Li-battery -10 years life time
Environmental Protection	IP 68, Ambient operation temp. -25°C ÷ +55°C
Display Units	Multi line 9 digit LC display (Programmable - m^3, USG, CuFt. Acre Feet, Flow rate and volume)
Output (optional)	Programmable dual open collector pulse output Powered loop 4-20 mA

Dimensions

Model		Octave				
Nominal size	(mm)	50	50 Threaded	65	80	100
	(inch)	2	2 Threaded	2.5	3	4
L – Length (mm)		200	300	200	225	250
B – Width (mm)		165	113	185	200	220
H – Height (mm)		194	155	210	210	223
h – Height (mm)		40	35	90	90	103
Weight (kg)		9	8	11.5	13	15



8.0 Mechanical Installation

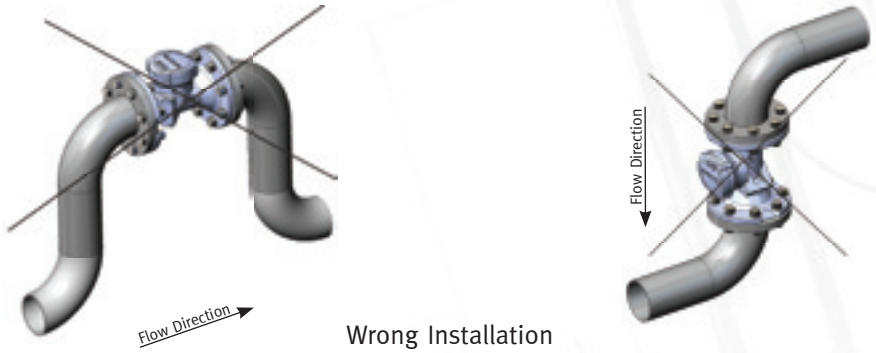
8.1 Handling the flow meter

Important handling information:

- Do not lift the Octave by the electronic housing.
- Do not carry the Octave by his lid.
- Do not place the Octave on the electronic housing.
- When handling the Octave, avoid hard blows, jolts or impacts.

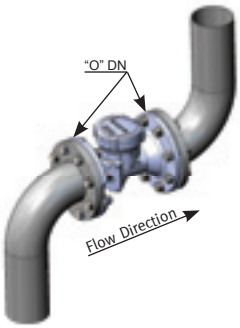
8.2 Installation: Location and Position

Proper Installation

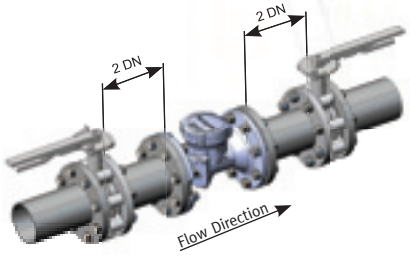


Wrong Installation

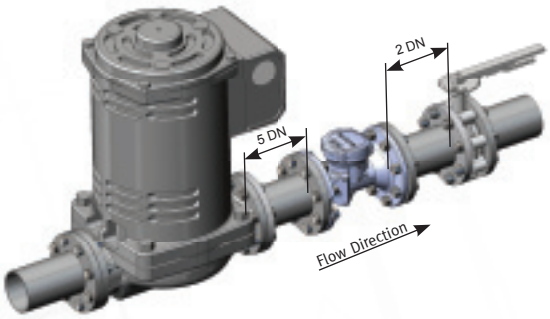
The following examples are Arad's recommendations for achieving top performance



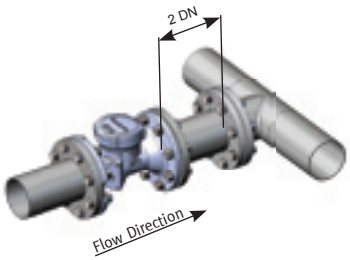
Zero (0) pipe diameters before and after elbows (90°)



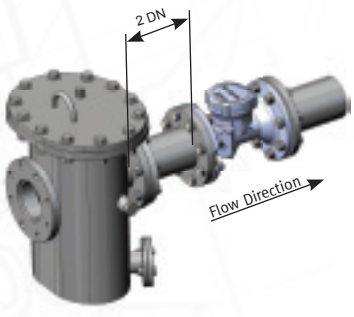
Minimum of two (2) pipe diameters before and after



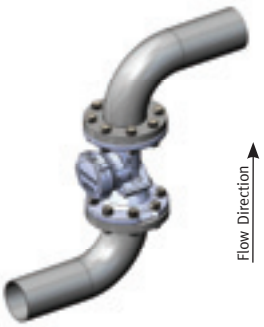
Minimum of five (5) pipe diameters after pumps



Minimum of two (2) pipe diameters before T connections



Minimum of two (2) pipe diameters after strainers



Zero (0) pipe diameters before and after elbows (90°) in vertical installations

9.0 Notes

- For proper flow measurements, the OCTAVE's measuring tube should be completely full at all times. Non-wetted sensors show loss of signal. Though this will not cause damage to the meter, it will, however, not measure flow and display zero
- Flow direction: The OCTAVE is a bidirectional flow meter. Note the indicating arrow on the OCTAVE's display for forward and backward flows
- In case of direct sunlight exposure, it is recommended to keep the lid closed, though no direct damage will occur with the lid open
- Do not expose the OCTAVE to excessive vibration. To avoid vibration, support the pipeline on both side of the meter
- Ambient working temperature: -25 to +55°C
- Water working temperature: 0.1 to +50°C
- To avoid measuring errors due to air in the flow tube, observe the following precautions:
  - Since air collects at the highest point of the system, installation of the flowmeter should be at the lowest point
  - Always install control valves downstream of the meter in order to avoid cavitation
  - ever install the meter on a pump suction side in order to avoid cavitation

10.0 Pipe flanges

- Refer to the standard dimensional drawings for flange spacing, accommodating for the thickness of gaskets
- Install meter in line with the pipe axis. The pipe flange faces must be parallel to each other
- Permissible length deviation: Lmax - Lmin ≤ 0.5mm (0.02")

11.0 Start-up

✓ Check that the meter has been installed correctly
✓ Check that the flow rate and volume units are correctly preprogrammed on the display
✓ Check that the output module is correctly attached

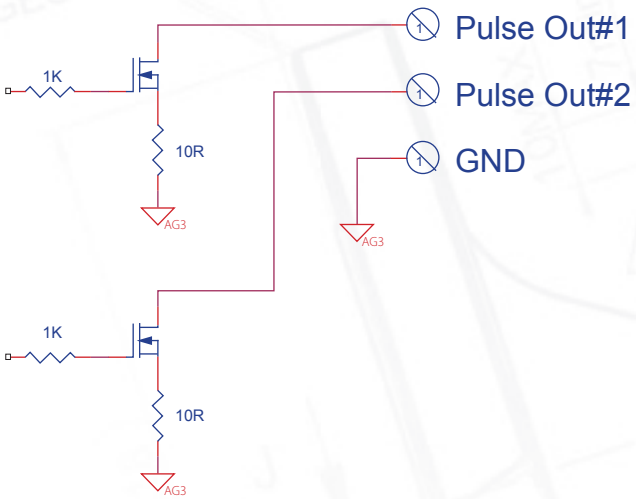
12.0 Electrical Outputs

12.1 Pulse Output (Digital)

- The OCTAVE is delivered with dual pulse output
- Pulse Type – open collector that allows current loading of 200mA, and up to 50volt
- The pulse width is programmable with a maximum resolution value of 1ms

Octave Pulse Output Module Specification

Outputs diagram



Output wire colors

Warning - Signal connection polarity is mandatory!

Red	Pulse Out#1
Green	Pulse Out#2
Black	GND

Pulse Duration table

Pulse per selected quantity	M3	USG	Cuft	A.F
	Max pulse width [ms]	Max pulse width [ms]	Max pulse width [ms]	Max pulse width [ms]
0.0001	1			
0.001	10			125
0.01	90		3	125
0.1	125	4	32	125
1	125	40	125	125
10	125	125	125	125
100	125	125	125	125
1000	125	125		

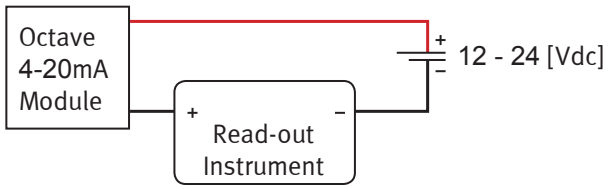
Output characteristics

Outputs Type	Open Drain
Cable Length	3 meters (up to maximum of 100 meters)
Maximum Supply Voltage	50Vdc
Maximum power load	200mA

12.2 4-20mA Module (Analog)

- The current output is a passive 4-20mA.
- 4mA is always "0" (zero) flow and the 20mA is factory programmable according to the customer requirements.. (If the customer did not specify, the 20mA will be the maximum flow rate)

4-20mA Outputs diagram



Output characteristics

Outputs Type	4-20mA passive current output
Supplied Cable Length	3 [meters]
Loop supply voltage	12 - 24 [Vdc]
Output Impedance	25 [MΩ] typ

Output wire colors

Warning - Signal connection polarity is mandatory!

Red	**current loop +**
Black	**current loop -**

13.0 Digital Display

- m³ Volume units
- Flow direction
- m3/h Flow rate units
- Alarm/Error
- Leak detector
- Output Mode
- Battery level
- Coil/3G/GSM- Active communication

14.0 Output Module Installation

If your Octave order includes output module, the following will explain how to attach it to the meter. Output module kit includes (Pic.1)

1. Output module
2. 2 Allen Screws 3mm X 20mm
3. O-ring
4. Sealing cap
5. 3mm Allen key

Stage 1:
Using the 3mm Allen key disassemble the cover (Pic. 2) from the meter, keep the cover the screws and the O-ring for future use (Pic.3).

Pic. 2

Pic. 3

Stage 2:
Place the O-ring in the groove (Pic.4 & 5).

Pic. 4

Pic. 5

Stage 3:
Insert the output module into the plug (Pic.6), and tighten the screws with the 3mm Allen key (Pic.7).

Pic. 6

Pic. 7

Stage 4:
Push the sealing cap to the lower hole of the module (Pic.8) and fixed it all the way in with a hammer (Pic.9).

Pic. 8

Pic. 9

ARAD
Innovation through precision, quality and performance

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